

# Keyboard Encoder Read Only Memory KEM

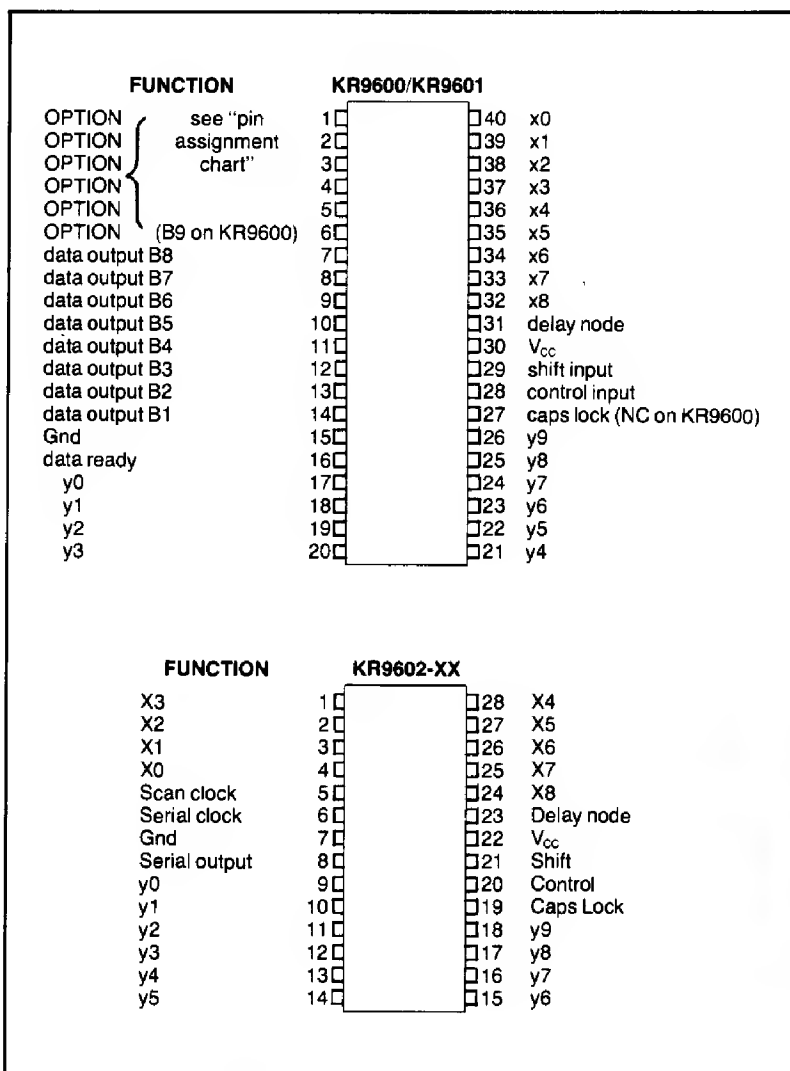
## FEATURES

- ☐ On-chip "caps" lock (KR9601, KR9602)
- ☐ On-chip auto repeat (KR9601, KR9602)
- ☐ Contact bounce protection
- ☐ N Key Rollover or Lockout operation
- ☐ Hysteresis on keyboard matrix inputs
- ☐ Tri-state TTL compatible data outputs
- ☐ Serial output (on KR9602 only)
- ☐ Quad Mode (Normal, shift, control, shift-control)
- ☐ High frequency clock input
- ☐ Pin-compatible with KR3600 (KR9600)
- ☐ Static charge protection on all inputs and outputs
- ☐ + 5 volt supply

## EXTERNALLY SELECTABLE OPTIONS ON KR9600 AND KR9601

- ☐ Pulse or level data ready output signal
- ☐ External clock input
- ☐ On chip master/slave oscillator
- ☐ All 10 output bits available
- ☐ Lockout/Rollover external selection
- ☐ Chip enable external selection
- ☐ Data complement control
- ☐ Any Key Down output
- ☐ Selectable Auto-Repeat rate
- ☐ Programmable Auto-Repeat rate

## PIN CONFIGURATION\*



\*PLCC (J LEAD QUAD PACK) also available.

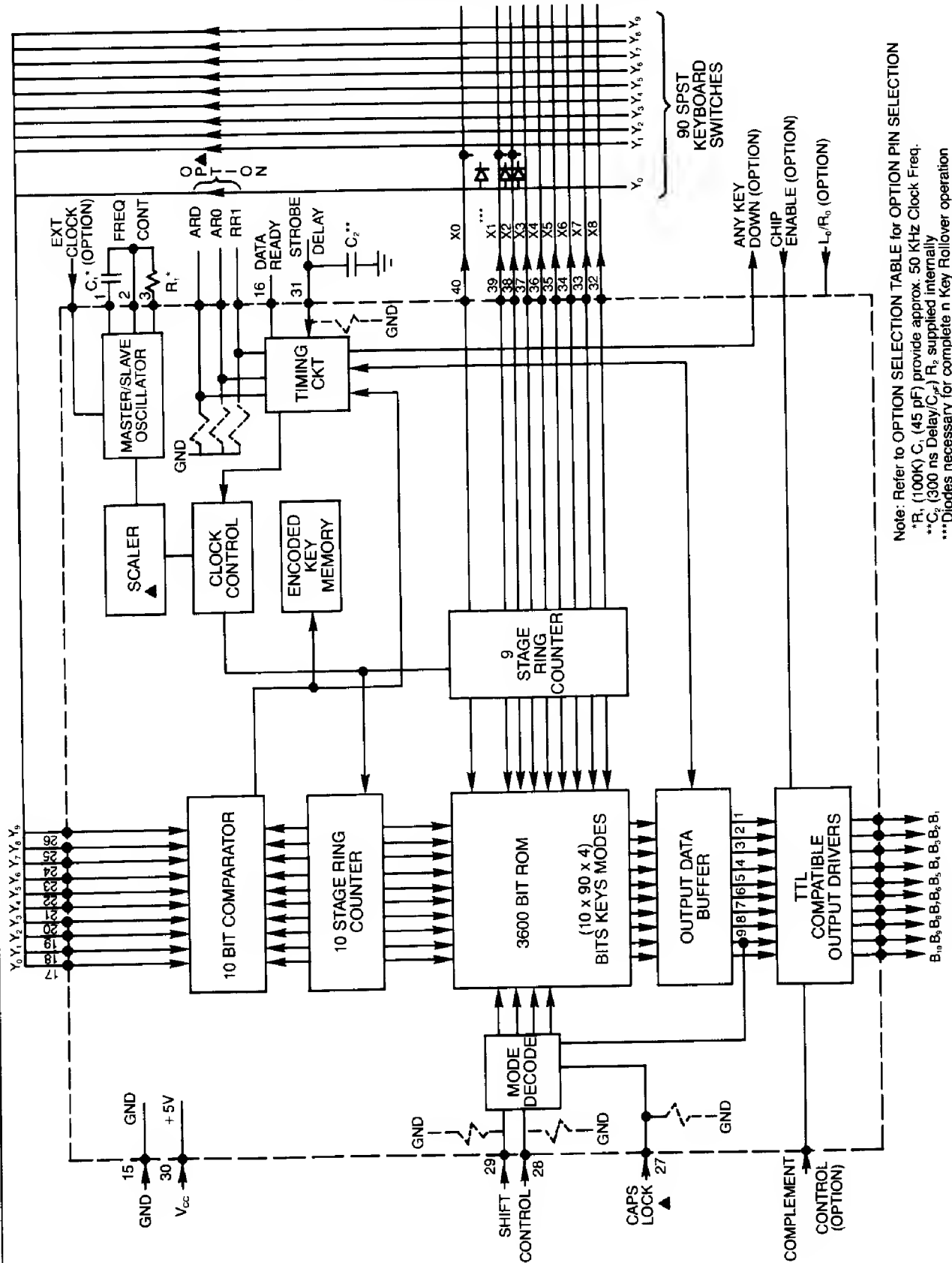
## GENERAL DESCRIPTION

The KR9600/1/2 is a keyboard encoder that contains all the logic necessary to debounce and encode SPST key-switches into a fully decoded data output of up to 10 bits. The KR9600/1/2 contains a 3600 bit ROM, 9 stage and 10 stage ring counters, a 10 bit comparator, timing circuitry, a 90 bit memory to store the location of encoded keys for N key rollover operation, an externally controllable delay net-

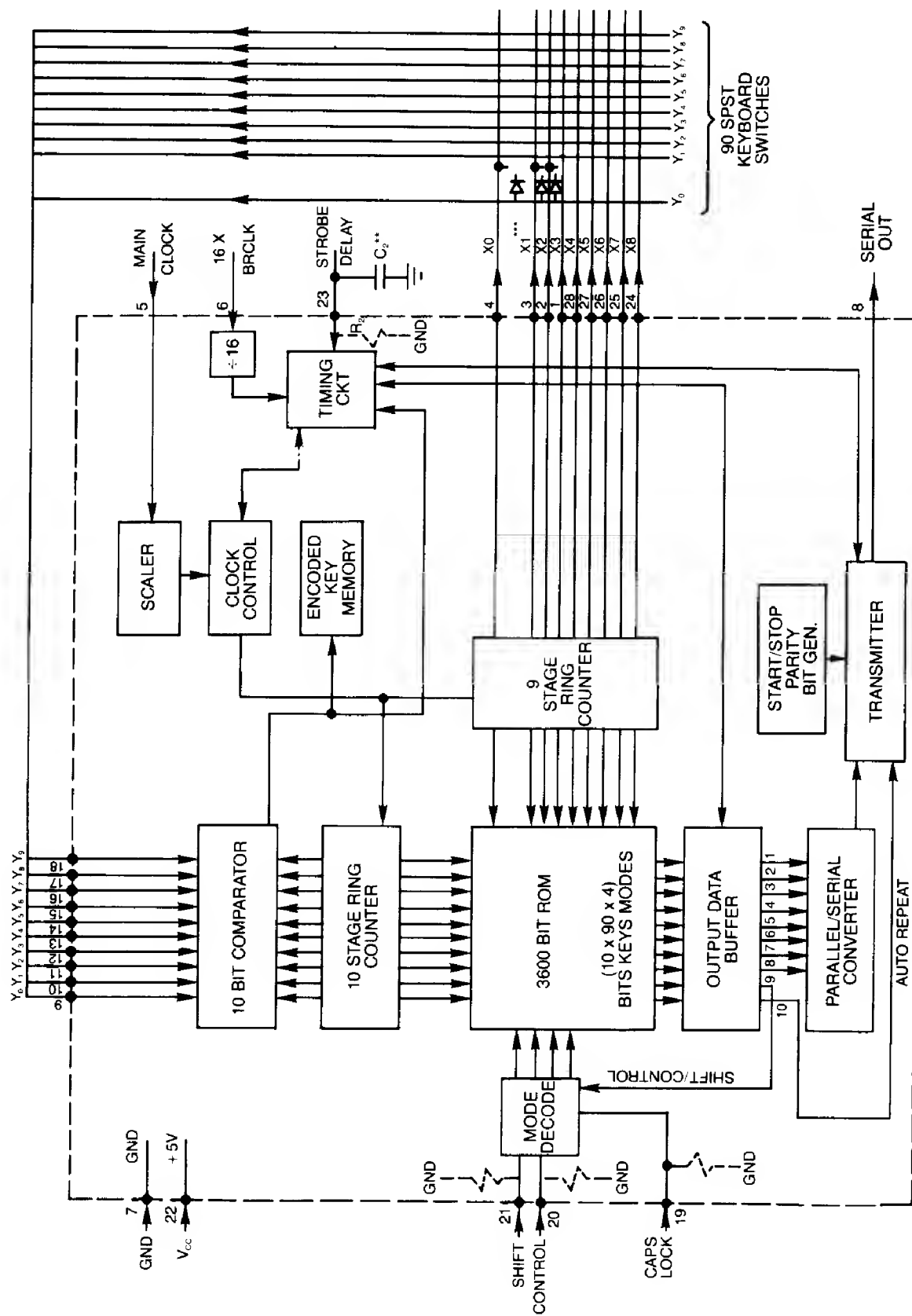
work for eliminating the effect of contact bounce, an output data buffer and TTL compatible output drivers.

The KR9600 and the KR9601 provide a parallel data output in a 40 pin configuration with pin selectable options, while the KR9602 provides a serial asynchronous output in a 28 pin configuration with mask programmable options. (Ref. KR9600/1/2 custom coding information sheet).

# BLOCK DIAGRAM FOR KR9600/KR9601



# BLOCK DIAGRAM FOR THE KR9602



Note: \*\*C<sub>2</sub> (300 ns Delay/C<sub>2</sub>) R<sub>2</sub> supplied internally  
 \*\*\*Diodes necessary for complete n Key Rollover operation

## DESCRIPTION OF PIN FUNCTIONS

| NAME                         | SYMBOL          | KR9600<br>PIN # | KR9601<br>PIN # | KR9602<br>PIN # | FUNCTION   |
|------------------------------|-----------------|-----------------|-----------------|-----------------|--|
| X OUTPUTS                    | X0-X8           | 40-32           | 40-32           | 4-1<br>28-24    | External outputs from the 9-stage ring counter to the keyboard to form X-Y matrix with the keyboard switches as the crosspoints.                           |
| Y INPUTS                     | Y0-Y9           | 17-26           | 17-26           | 9-18            | External inputs from the keyboard X-Y matrix.  |
| EXTERNAL CLOCK<br>(see note) | ***             | 1               | 1               | 5               | External clock input.  |
| SERIAL CLOCK                 | ***             | ***             | ***             | 6               | Serial input Baud rate clock, for KR9602.  |
| DATA OUTPUTS                 | B8-B1           | 7-14            | 7-14            | 8               | Data outputs B1-B8. Parallel outputs for the KR9600/9601, serial output for the KR9602.  |
| DATA READY                   | DR              | 16              | 16              | N/A             | This output, which can be a level or a pulse, signals that a key closure has been detected and that data is available at the output port.                  |
| DELAY NODE<br>INPUT          | DELAY           | 31              | 31              | 23              | Externally controllable delay network for eliminating the effect of switch contact bounce.   |
| SHIFT INPUT                  | SHIFT           | 29              | 29              | 21              | This input is used to select the shift mode data.  |
| CONTROL INPUT                | CNTRL           | 28              | 28              | 20              | This input is used to select the control mode data. Simultaneous assertion of shift and control inputs will place the encoder into the shift-control mode. |
| CAPS LOCK                    | CAPS            | see<br>note     | 27              | 19              | This input "ANDed" with bit B9 of the ROM will cause a mode shift. See "programming options".  |
| POWER SUPPLY                 | V <sub>cc</sub> | 30              | 30              | 22              | + 5V power supply.   |
| GROUND                       | Gnd             | 15              | 15              | 7               | Ground.  |
| OPTION PINS                  |                 | see<br>note     | 1-6             | N/A             | See option selection table for pin assignment.   |

Note: Caps Lock and Auto-Repeat are not available on KR9600.  
See option selection table for pin assignment.

## DESCRIPTION OF OPERATION

The main clocks for the KR9600 and KR9601 are derived from either an external clock source or the internal oscillator. The KR9602 requires an external clock. The external clock is routed to a divider with a mask programmable division rate from 1 to 63 to generate the internal clock.

The keys are scanned in a nine output by ten input matrix, each key having a unique input-output combination connected to it. The inputs all go selectively to a level detector which has logically variable (1's and 0's) levels and hysteresis. The outputs are enabled one at a time from output X0 towards X8, at a rate of 10-100KHz, through a 9 stage ring counter. The 10 inputs are searched one at a time from Y0 to Y9, through a 10 stage ring counter, each time one of the outputs is enabled. The output and input pins all have pullups to V<sub>cc</sub> and are precharged each clock even if the scan is stopped at one key. When a level on the selected path to the comparator matches a level on the corresponding comparator input from the 10 stage ring counter and the key has not been encoded, the switch bounce delay network is enabled. The key down stroke is examined, without advance to the next key location, until the key has been stable for the length of the DELAY CAP pin to discharge. The code for the depressed key is transferred to the output data buffer and the data ready signal appears.

The scan has two modes as determined by the L0ckout/Rollover option. Once a key is determined to be down the scan will not advance if in the L0ckout mode. Consequently a new key closure is not detected until the previously depressed key is released. The scan sequence will resume upon key release and the output data buffer stores the code of the last key encoded. In the Rollover mode a "1" is stored in the encoded key memory and the scan sequence is resumed and the code for the last encoded key remains in the data output buffer. Each depressed key is encoded regardless of the state of the previously depressed keys. The internal keyboard ROM is 10 bits wide. Bits 1-8 are output via data outputs B1-B8. Bits 9 and 10 may be output as data and/or utilized respectively for Caps-lock and Auto-repeat select. This allows mask programmable selection of which keys will have caps-lock and auto-repeat. When selected, the auto repeat will commence with a "long" delay after key depression followed by "short" delays. The duration of the delays varying with the clock frequency and the state of the ARD, AR0, and AR1 signals.

A Chip Enable input is available to enable the parallel output buffer. Data Ready can be put in the high-impedance state with Chip Enable (CE) or can be open drain as a mask programmable option to facilitate wire-oring as an interrupt.

In the serial output version of KR9602, when a key is debounced and then called valid, the serial shift register is loaded with the data (8 bits B1-B8) from the ROM, the data from the parity generator, and the data from the start and stop bits generator. Bits B9 and B10 are internally used respectively for Caps-lock and Auto-repeat select. The data register is then allowed to shift data out at the rate of one bit per 16 clocks of the baud rate clock pin, on the negative edge of that clock. If the baud rate clock is too slow with respect to the internal clock, and the keyboard were allowed to continue scanning when the data register is loaded, then new data could be loaded on top of shifting-out data.

To avoid this, if a new key is depressed before the previous data is fully shifted out of the device, including the stop bits, the delay cap will be allowed to decay but the internal logic will delay its effect until the shift out of the previous data is completed. If the new key is released before the end of the extended delay time it will not be encoded.

### OPTION SELECTION TABLE

Since the selected coding of each key and all the options are defined during the manufacture of the chip, the coding and options can be changed to fit any particular application of the keyboard. Up to 360 codes of up to ten bits can be programmed into the KR9600/KR9601 ROM covering most popular codes such as ASCII, EBCDIC, SELECTRIC etc. as well as many specialized codes.\*

### Pin Assignment for KR9600/KR9601

The chip pins from pin #1 thru pin #6 are optionally connected to differing logic functions. Many of the functions are available on more than one pin.

| PIN | FUNCTION (input unless noted)               |
|-----|---|
| 1   | Ext clock (opt. internal divisor of 1-63)** |
| 1   | Pin 1 of Internal oscillator.               |
| 2   | Pin 2 of Internal oscillator.               |
| 2   | Lo/Ro CC CE ARD** AR0** AR1**               |
| 3   | Pin 3 of Internal oscillator.               |
| 3   | Lo/Ro CC CE ARD** AR0** AR1**               |
| 4   | AKO output                                  |
| 4   | Lo/Ro CC CE ARD** AR0** AR1**               |
| 5   | AKO or B10 output                           |
| 5   | Lo/Ro CC CE ARD** AR0** AR1**               |
| 6   | B9 or AKO** output                          |

### Options Available for the KR9602:

The following options can be obtained on the KR9602 only with a mask program, and are not pin selectable:

Lo/Ro, CC, AUTO-REPEAT, LONG DELAY, SHORT DELAY, CLOCK DIVISOR 1,2,4,8,16,32,63; PARITY, 1 OR 2 STOP BITS.

### Legend

CC = COMPLEMENT CONTROL  
Lo/Ro = LOCKOUT/ROLLOVER  
B9 = B9 (DATA) OUTPUT  
INTERNAL CLOCK = SELF CONTAINED OSCILLATOR (Not available in KR9602)  
EXTERNAL CLOCK = EXTERNAL FREQUENCY SOURCE  
ARD = INITIAL AUTO-REPEAT DELAY  
ARO, AR1 = SECONDARY AUTO-REPEAT DELAY, OR NO AUTO-REPEAT WHEN BOTH ARE FALSE.

AKO = ANY KEY DOWN  
CE = CHIP ENABLE  
B10 = B10 (DATA) OUTPUT

\*Contact local sales office for custom coding sheet.

\*\*Not available on the KR9600.

### PROGRAMMING OPTIONS

The various options on the KR9600 and KR9601 are user selectable via externally programmable pins, but they are fixed, internally mask programmed, for the KR9602.

#### Oscillator:

The main clocks are derived from either an external clock source or from the Internal oscillator. The resultant signal is then routed to a divider with a mask programmable division rate from 2 to 63. If no division is required then the divider is bypassed. The external clock requires one pin (pin #1), while the Internal oscillator needs three pins (pins #1, 2, 3) for frequency selection via an external resistor and capacitor.

#### Lockout/Rollover: LO/RO

This option selects the operation of the key scan when a new key is detected. In Lockout the scan stops as long as the key is down. In Rollover the scan stops till the new key is debounced by the DELAY CAP and the key code is output. Then the key position is marked as down and the scan continues until another new key is seen. The option is selected either by an external pin or internally mask programmed, fixed in either state. The external LOCKOUT selection is optionally hi or low active. A pull-down resistor to ground is optional.

#### Complement Control: CC

This option inverts the logic true state of the DATA OUT-

PUTS and can optionally additionally invert the logic true state of the DATA READY pin. The option can be internally fixed as true or false where true will output a high logic level. When externally selected the option can be either input high or low active true. The pulldown to ground is optional.

#### Data Ready:

The data ready pin is optionally either a pulse or level upon an output state ready to transfer. This transfer occurs when a new key is encoded or when the current key is repeating via the repeat logic. This output is individually capable of being disabled via CE or inverted via CC. To invert DATA READY is to have the pulse go logic low or the level fall to logic low active when the output is allowed to drive out of the chip.

#### Any Key Down: AKO output

The AKO output is an indicator to tell that there is at least one key determined to be depressed. The output is optionally logic high or low true. The CE can be separately used to set the output in the high impedance mode. AKO will reset one full keyboard scan time after the last key is released. AKO cannot be inverted by CC (complement control).

#### Chip Enable: $\overline{CE}$

The chip enable option can be internally fixed to true or

can be externally selected. When an external pin is used the true level is only low true. The true state means that the outputs connected to CE will go to the driven state from the high-impedance condition. Output pins B1-B10 are always affected by Chip Enable (CE), optional for Data Ready and Any Key Down. A pulldown to ground is optional.

### Shift Control Lock: S C L

These three pins determine what will be output in response to a new key being detected. The Caps Lock pin is optional on the KR9601 and KR9602 but it is not available on the KR9600. All three pins have optional pulldown resistors to ground. The Lock option is allowed if data bit nine of the ten data bits is programmed as true. In other words the Rom is read with no lock logic allowed, but with the full influence of the Shift and Control pins. This determines the B9 output which is used to see if this key can be shifted (be it a control code or not) by modifying the effect of the Shift upon a second read of the rom. The operation of the allowed Lock follows this table:

| L | B9 | S | C | Result |   |
|---|----|---|---|--------|---|
| F | F  | F | F | N      |   |
| F | F  | F | T | C      |   |
| F | F  | T | F | S      | L = CAPS LOCK                                 |
| F | F  | T | T | SC     | B9 = DATA OUTPUT B9                           |
|   |    |   |   |        | N = NORMAL                                    |
| F | T  | F | F | N      | S = SHIFT                                     |
| F | T  | F | T | C      | C = CONTROL                                   |
| F | T  | T | F | S      | SC = SHIFT and CONTROL                        |
| F | T  | T | T | SC     |   |
| T | F  | F | F | N      |   |
| T | F  | F | T | C      |   |
| T | F  | T | F | S      |   |
| T | F  | T | T | SC     |   |
| T | T  | F | F | S      | Force N->S allow shift (ie m->M)              |
| T | T  | F | T | SC     | Force C->SC shift of Control                  |
| T | T  | T | F | *S/N   | Opt Force S->N allow reverse (ie M->m)        |
| T | T  | T | T | *SC/C  | Opt Force SC->C remove shift in Shift-Control |

\*The mask programmable option for the removal of the shift is coded as either ON for all keys or OFF. Note that the B9 DATA output (and all the others) is the code of the second decode. Note that shift only occurs when both the lock is true and the unmodified code gives a B9 ROM output as true.

### Repeat: ARD AR0 AR1

When the Auto-repeat option is selected and a key is pressed, either of two delays can be selected. Typically a long initial delay after the key is pressed, and short delays afterwards if the key is still pressed. These delays

consist of a programmable number of scan frequency time clocks varying from 2 to 131071 clock times.

This option is masked programmable and dependent on the programming of the data bit 10 of the ten data outputs to be true for the resultant key code (after lock logic) and upon whether any repeat action should occur at all.

There are three optional pins associated with the auto repeat logic: AR0, AR1, and ARD. Each of these can individually optionally have a pulldown resistor to ground. ARD controls the selection of the initial repeat delay count code, while the combination of AR0 and AR1 controls the selection of the short delays as shown below. If no external pins are desired then those functions can be mask programmed.

### TYPICAL INITIAL REPEAT DELAY COUNTS

ARD = hi 80000 clock times  
ARD = low 40000 clock times

The repeat delays are selected by a two bit code where one decode is used to disable the repeat operation completely.

### TYPICAL SECONDARY REPEAT COUNTS

| AR0 | AR1 | Count                    |
|-----|-----|--------------------------|
| 0   | 0   | All Auto-Repeat Disabled |
| 0   | 1   | 6250                     |
| 1   | 0   | 3125                     |
| 1   | 1   | 1250                     |

### Typical Example:

One typical approach would be to mask program ARD for only one long delay value and mask AR0 to ground. This way one can save two option pins for ARD and AR0 and still be able to select or disable auto-repeat via AR1 and have the option of having one fixed short delay value.

### ROM Data:

The actual programming data is in 10 bit wide characters with four function codes for each key position. There are 90 key positions organized as 9 "X" outputs with 10 "Y" inputs. The four functions as previously defined are Control, Shift, Normal, and Shift-Control.

The use of the optional Lock requires the programming of the B9 data bit. The use of the optional Auto-Repeat requires the programming of the B10 data bit. If the B9 or B10 outputs are used then these will show the result of the contents of the "corrected" key function data bits. The "corrected" function is the possibly changed Normal to Shift etc. etc. so that the output is that of the 'Shifted key code' NOT that of the initial key code.

### Minimum Switch Closure:

$$T = \text{Switch bounce} + (90 \times 1/f) + \text{Strobe delay} + \text{Strobe width}$$

$\downarrow$   
 maximum  
expected

$\downarrow$   
 determined  
by frequency  
of operation

$\downarrow$   
 determined  
by external  
capacitance

$\downarrow$   
 minimum time  
required by  
external circuitry

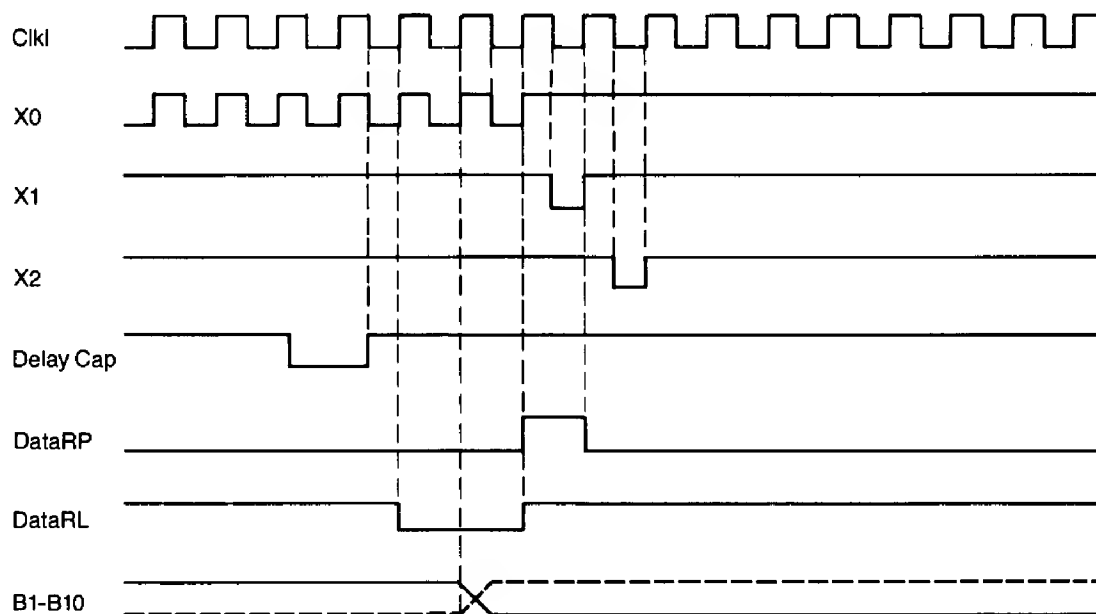
**CONDITIONS:**

The clock divider is 1 so that CkI is "same as clock IN".

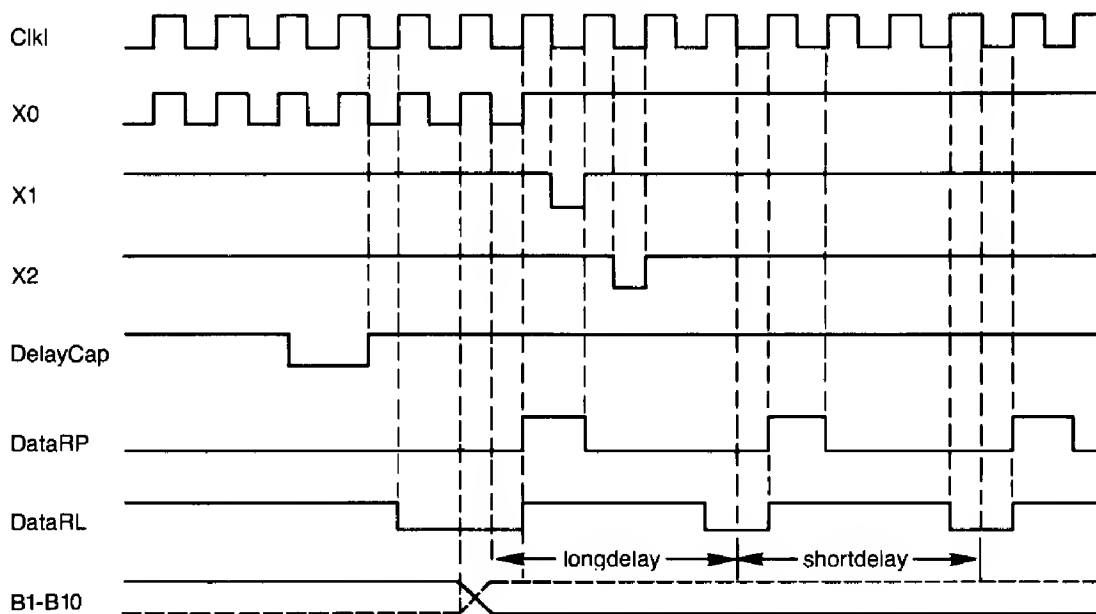
A key is pressed down at X0Y0 but the delay cap has not timed out.

Data Ready is high true and we have already had another key.

DataRP = Data Ready as a Pulse      DataRL = Data Ready as a Level



Condition: Test mode autorepeat at divide by 4 and keep key down



# ELECTRICAL CHARACTERISTICS: KR9600, KR9601, KR9602

## MAXIMUM GUARANTEED RATINGS

|   |                 |
|---|-----------------|
| Operating Temperature Range**                       | 0°C to +70°C    |
| Storage Temperature Range                           | -55°C to +150°C |
| Lead Temperature (soldering, 10 sec.)               | +325°C          |
| Positive Voltage on any Pin, with respect to ground | +8.0V           |
| Negative Voltage on any Pin, with respect to ground | -0.3V           |

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 0°C to 70°C, V<sub>CC</sub> = +5V ± 5%, unless otherwise noted)

| PARAMETER  | SYMBOL           | MIN                 | TYP  | MAX  | UNIT | COMMENTS                  |
|--|------------------|---------------------|------|------|------|---------------------------|
| <b>D.C. CHARACTERISTICS</b>                      |                  |                     |      |      |      |                           |
| INPUT VOLTAGE LEVELS                             |                  |                     |      |      |      |                           |
| Low Level  | V <sub>IL</sub>  |                     |      | 0.8  | V    | All inputs                |
| High Level                                       | V <sub>IH</sub>  | 2.0                 |      |      | V    | Except Y + 16X CLK        |
|  |                  | 2.2                 |      |      | V    | 16X CLK only              |
| Y INPUTS   |                  |                     |      |      |      |                           |
| High Level                                       | V <sub>YIH</sub> | 2.8                 |      |      | V    | Y input                   |
| Low Level  | V <sub>YIL</sub> |                     |      | 0.8  | V    | Y input                   |
| INPUT CURRENT                                    |                  |                     |      |      |      |                           |
| Leakage  | I <sub>L</sub>   |                     |      | 10.0 | μA   | All inputs except Y       |
|  |                  |                     |      |      |      | V <sub>IN</sub> = 5V      |
| Input with Pull-down resistor selected as option |                  |                     |      |      |      |                           |
| Y inputs   | I <sub>YIL</sub> | 75                  | -400 | 220  | μA   | V <sub>IN</sub> = 5V      |
|  |                  | -100                |      | -500 | μA   | V <sub>YIL</sub> = 1 volt |
|  |                  |                     |      |      |      | Y inputs only             |
| OUTPUT VOLTAGE LEVELS                            |                  |                     |      |      |      |                           |
| Low Level  | V <sub>OL</sub>  |                     |      | 0.4  | V    | I <sub>OL</sub> = 1.6 mA  |
| High Level                                       | V <sub>OH</sub>  | 2.4                 |      |      | V    | I <sub>OH</sub> = 100 μA  |
|  |                  |                     |      |      |      | Except X outputs          |
| X output voltage                                 | V <sub>OL</sub>  |                     | 0.4  |      | V    | 600 μA                    |
|  | V <sub>OH</sub>  | 3.4                 | 4.0  |      | V    | clock high                |
|  |                  |                     |      |      |      | I <sub>OH</sub> = 10 μA   |
|  |                  |                     |      |      |      | B1-B10                    |
| TRI-STATE LEAKAGE                                |                  |                     |      | 10   | μA   |                           |
| INPUT CAPACITANCE                                |                  |                     |      |      |      |                           |
| All inputs                                       | C <sub>IN</sub>  |                     |      | 10   | pF   | Except Y inputs           |
| POWER SUPPLY CURRENT                             | I <sub>CC</sub>  |                     | 20   | 40   | mA   | KR9600/01                 |
|  | I <sub>CC</sub>  |                     | 15   | 35   | mA   | KR9602                    |
| <b>A.C. CHARACTERISTICS</b>                      |                  |                     |      |      |      |                           |
| CLOCK FREQUENCY*                                 | F <sub>IN</sub>  | 0.01                |      | 4    | MHz  | KR9601/02                 |
|  |                  | 0.01                |      | 0.1  | MHz  | KR9600                    |
| 16X CLOCK FREQUENCY                              |                  | DC                  |      | 640  | KHz  | KR9602                    |
| Chip enable access time                          | T <sub>CE</sub>  |                     |      | 250  | ns   |                           |
| SWITCH CHARACTERISTICS                           |                  |                     |      |      |      |                           |
| Min switch closure                               |                  |                     |      |      |      | see timing diagram        |
| Contact closure resistance                       | Z <sub>CC</sub>  |                     |      | 300  | ohms |                           |
|  | Z <sub>CC</sub>  | 1 x 10 <sup>7</sup> |      |      |      |                           |

NOTE: The KR9600 is a direct replacement for the KR3600. Please note that due to the logic level of the KR9600, when replacing the KR3600 in a N-Key rollover system where diodes are utilized, the polarity of the diodes must be reversed.

\* Divisor on KR9601/02 must be selected such that the resulting internal scan frequency is 10 KHz min to 100 KHz max.

\*\* Parts optionally available in extended temperature ranges in hermetic packages. Inquire at factory.



## KR9600-PRO DESCRIPTION

The KR9600 PRO is a MOS/LSI device intended to simplify the interface of a microprocessor to a keyboard matrix. Like the other KR9600 parts, the KR9600 PRO contains all of the logic to de-bounce and encode key-switch closures, while providing either a 2-key or N-key rollover.

The output of the KR9600 PRO is a simple binary code which may be converted to a standard information code by a PROM or directly by a microprocessor. This permits a user maximum flexibility of key layout with simple field programming.

The code in the KR9600 is shown in Table I. The format is simple: output bits, 9, 8, 7, 6, 5, 4 and 1 are a binary sequence. The count starts at X0, Y0 and increments through X0Y1, X0Y2...X8Y9. Bit 9 is the LSB; bit 1 is the MSB.

Bits 2 and 3 indicate the mode as follows:

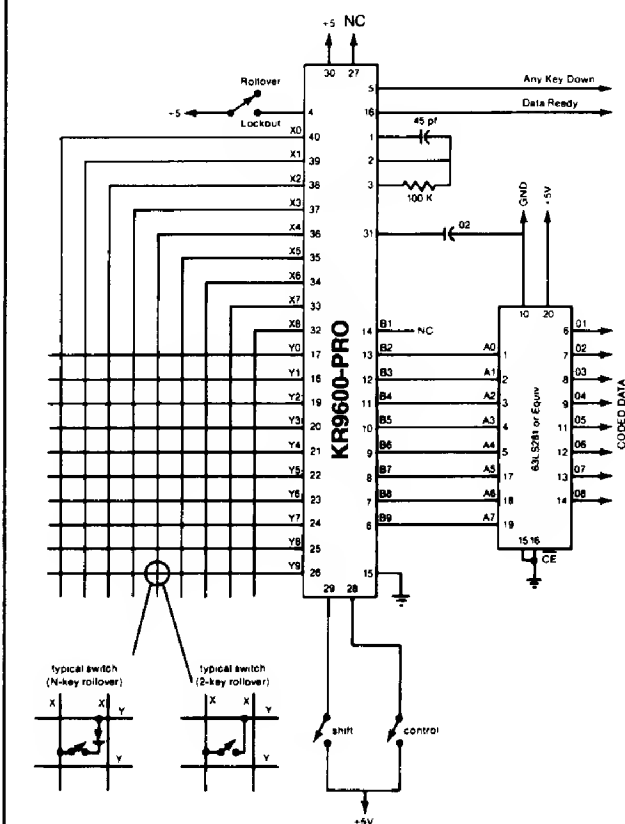
| Bit 2 | Bit 3 |               |
|-------|-------|---------------|
| 0     | 0     | Normal        |
| 0     | 1     | Shift         |
| 1     | 0     | Control       |
| 1     | 1     | Shift Control |

For maximum ease of use and flexibility, an internal scanning oscillator is used, with pin selection of N-key lockout (also known as 2-key rollover) and N-key rollover. An "any-key-down" output is provided for such uses as repeat oscillator keying.

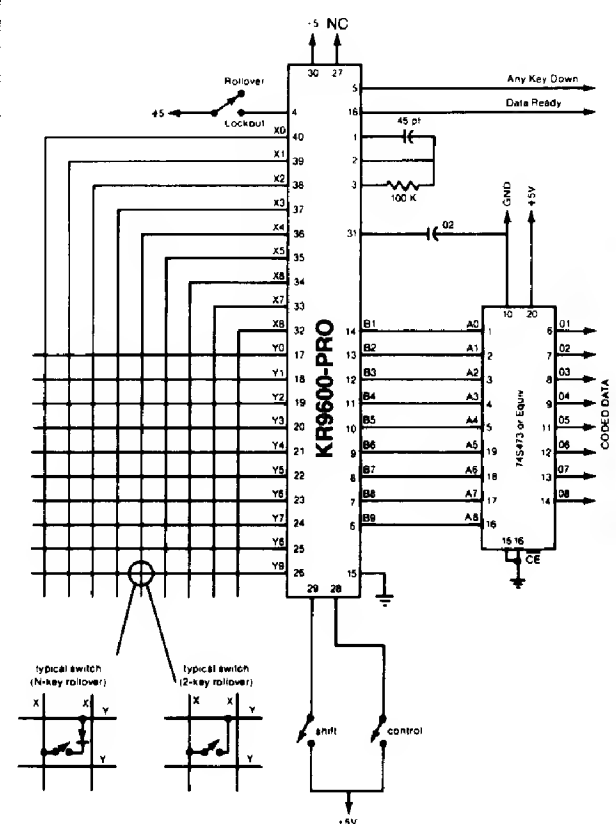
Figure 1 shows a PROM-encoded 64 key, 4 mode application, using a 256 x 8 PROM, and Figure 2 a full 90 key, 4 mode application utilizing a 512 x 8 PROM.

If N-key rollover operation is desired, it is recommended that a diode be inserted in series with each switch as shown. This prevents "phantom" key closures from resulting if three or more keys are depressed simultaneously.

**FIGURE 1**  
**KR9600 PRO TYPICAL APPLICATION**  
**64 KEY, 4 MODE**



**FIGURE 2**  
**KR9600 PRO TYPICAL APPLICATION**  
**90 KEY, 4 MODE**



**TABLE 1**  
**KR9600-PRO CODING SHEET AND OPTIONS**

| XY | Normal<br>B-12345678 910 | Shift<br>B-12345678 910 | Control<br>B-12345678 910 | Shift/Control<br>B-12345678 910 |
|----|--------------------------|-------------------------|---------------------------|---------------------------------|
| 00 | 000000000                | 001000000               | 010000000                 | 011000000                       |
| 01 | 000000001                | 001000001               | 010000001                 | 011000001                       |
| 02 | 000000010                | 001000010               | 010000010                 | 011000010                       |
| 03 | 000000011                | 001000011               | 010000011                 | 011000011                       |
| 04 | 000000100                | 001000100               | 010000100                 | 011000100                       |
| 05 | 000000101                | 001000101               | 010000101                 | 011000101                       |
| 06 | 000000110                | 001000110               | 010000110                 | 011000110                       |
| 07 | 000000111                | 001000111               | 010000111                 | 011000111                       |
| 08 | 000001000                | 001001000               | 010001000                 | 011001000                       |
| 09 | 000001001                | 001001001               | 010001001                 | 011001001                       |
| 10 | 000001010                | 001001010               | 010001010                 | 011001010                       |
| 11 | 000001011                | 001001011               | 010001011                 | 011001011                       |
| 12 | 000001100                | 001001100               | 010001100                 | 011001100                       |
| 13 | 000001101                | 001001101               | 010001101                 | 011001101                       |
| 14 | 000001110                | 001001110               | 010001110                 | 011001110                       |
| 15 | 000001111                | 001001111               | 010001111                 | 011001111                       |
| 16 | 000010000                | 001010000               | 010010000                 | 011010000                       |
| 17 | 000010001                | 001010001               | 010010001                 | 011010001                       |
| 18 | 000010010                | 001010010               | 010010010                 | 011010010                       |
| 19 | 000010011                | 001010011               | 010010011                 | 011010011                       |
| 20 | 000010100                | 001010100               | 010010100                 | 011010100                       |
| 21 | 000010101                | 001010101               | 010010101                 | 011010101                       |
| 22 | 000010110                | 001010110               | 010010110                 | 011010110                       |
| 23 | 000010111                | 001010111               | 010010111                 | 011010111                       |
| 24 | 000011000                | 001011000               | 010011000                 | 011011000                       |
| 25 | 000011001                | 001011001               | 010011001                 | 011011001                       |
| 26 | 000011010                | 001011010               | 010011010                 | 011011010                       |
| 27 | 000011011                | 001011011               | 010011011                 | 011011011                       |
| 28 | 000011100                | 001011100               | 010011100                 | 011011100                       |
| 29 | 000011101                | 001011101               | 010011101                 | 011011101                       |
| 30 | 000011110                | 001011110               | 010011110                 | 011011110                       |
| 31 | 000011111                | 001011111               | 010011111                 | 011011111                       |
| 32 | 000100000                | 001100000               | 010100000                 | 011100000                       |
| 33 | 000100001                | 001100001               | 010100001                 | 011100001                       |
| 34 | 000100010                | 001100010               | 010100010                 | 011100010                       |
| 35 | 000100011                | 001100011               | 010100011                 | 011100011                       |
| 36 | 000100100                | 001100100               | 010100100                 | 011100100                       |
| 37 | 000100101                | 001100101               | 010100101                 | 011100101                       |
| 38 | 000100110                | 001100110               | 010100110                 | 011100110                       |
| 39 | 000100111                | 001100111               | 010100111                 | 011100111                       |
| 40 | 000101000                | 001101000               | 010101000                 | 011101000                       |
| 41 | 000101001                | 001101001               | 010101001                 | 011101001                       |
| 42 | 000101010                | 001101010               | 010101010                 | 011101010                       |
| 43 | 000101011                | 001101011               | 010101011                 | 011101011                       |
| 44 | 000101100                | 001101100               | 010101100                 | 011101100                       |
| 45 | 000101101                | 001101101               | 010101101                 | 011101101                       |
| 46 | 000101110                | 001101110               | 010101110                 | 011101110                       |
| 47 | 000101111                | 001101111               | 010101111                 | 011101111                       |
| 48 | 000110000                | 001110000               | 010110000                 | 011110000                       |
| 49 | 000110001                | 001110001               | 010110001                 | 011110001                       |
| 50 | 000110010                | 001110010               | 010110010                 | 011110010                       |
| 51 | 000110011                | 001110011               | 010110011                 | 011110011                       |
| 52 | 000110100                | 001110100               | 010110100                 | 011110100                       |
| 53 | 000110101                | 001110101               | 010110101                 | 011110101                       |
| 54 | 000110110                | 001110110               | 010110110                 | 011110110                       |
| 55 | 000110111                | 001110111               | 010110111                 | 011110111                       |
| 56 | 000111000                | 001111000               | 010111000                 | 011111000                       |
| 57 | 000111001                | 001111001               | 010111001                 | 011111001                       |
| 58 | 000111010                | 001111010               | 010111010                 | 011111010                       |
| 59 | 000111011                | 001111011               | 010111011                 | 011111011                       |
| 60 | 000111100                | 001111100               | 010111100                 | 011111100                       |
| 61 | 000111101                | 001111101               | 010111101                 | 011111101                       |
| 62 | 000111110                | 001111110               | 010111110                 | 011111110                       |
| 63 | 000111111                | 001111111               | 010111111                 | 011111111                       |
| 64 | 100000000                | 101000000               | 110000000                 | 111000000                       |
| 65 | 100000001                | 101000001               | 110000001                 | 111000001                       |
| 66 | 100000010                | 101000010               | 110000010                 | 111000010                       |
| 67 | 100000011                | 101000011               | 110000011                 | 111000011                       |
| 68 | 100000100                | 101000100               | 110000100                 | 111000100                       |
| 69 | 100000101                | 101000101               | 110000101                 | 111000101                       |
| 70 | 100000110                | 101000110               | 110000110                 | 111000110                       |
| 71 | 100000111                | 101000111               | 110000111                 | 111000111                       |
| 72 | 100001000                | 101001000               | 110001000                 | 111001000                       |
| 73 | 100001001                | 101001001               | 110001001                 | 111001001                       |
| 74 | 100001010                | 101001010               | 110001010                 | 111001010                       |
| 75 | 100001011                | 101001011               | 110001011                 | 111001011                       |
| 76 | 100001100                | 101001100               | 110001100                 | 111001100                       |
| 77 | 100001101                | 101001101               | 110001101                 | 111001101                       |
| 78 | 100001110                | 101001110               | 110001110                 | 111001110                       |
| 79 | 100001111                | 101001111               | 110001111                 | 111001111                       |
| 80 | 100010000                | 101010000               | 110010000                 | 111010000                       |
| 81 | 100010001                | 101010001               | 110010001                 | 111010001                       |
| 82 | 100010010                | 101010010               | 110010010                 | 111010010                       |
| 83 | 100010011                | 101010011               | 110010011                 | 111010011                       |
| 84 | 100010100                | 101010100               | 110010100                 | 111010100                       |
| 85 | 100010101                | 101010101               | 110010101                 | 111010101                       |
| 86 | 100010110                | 101010110               | 110010110                 | 111010110                       |
| 87 | 100010111                | 101010111               | 110010111                 | 111010111                       |
| 88 | 100011000                | 101011000               | 110011000                 | 111011000                       |
| 89 | 100011001                | 101011001               | 110011001                 | 111011001                       |

**OPTIONS:**

Internal Oscillator (Pins 1, 2, 3)  
Lockout/Rollover (Pin 4)  
Internal Resistor to GND  
Lockout is Logic 1

Pulse Data Ready  
Any Key Down (Pin 5) Positive Output  
Internal Resistor to GND on Shift  
and Control Pins

# CODING FOR KR9600-STD

| XY | Normal<br>B-12345678910 | Shift<br>B-12345678910 | Control<br>B-12345678910 | Shift Control<br>B-12345678910 |
|----|-------------------------|------------------------|--------------------------|--------------------------------|
| 00 | 1 1000111001            | 0011111001             | 1 1000111011             | SUB 0101100001                 |
| 01 | q 1000110101            | 1000100101             | q 1000111111             | DLE 0000100001                 |
| 02 | a 1000010101            | A 1000000101           | a 1000011111             | @ 0000000101                   |
| 03 | z 0101110101            | Z 0101100101           | z 0101111111             | P 0000100101                   |
| 04 | HT 1001000001           | HT 1001000101          | HT 1001000001            | I 1001000101                   |
| 05 | H 0001000101            | H 0001000101           | H 0001000101             | H 0001000111                   |
| 06 | + 1101011001            | + 1101011001           | + 1101011001             | + 1101011011                   |
| 07 | SO 0111001001           | 0111111001             | SO 0111000001            | SO 0111000011                  |
| 08 | p 0000110101            | 0000000101             | NUL 0000000001           | NUL 0000000001                 |
| 09 | 1 1000111001            | 1000011001             | SOH 1000000001           | SOH 1000000001                 |
| 10 | 2 0100111001            | 0000000101             | 2 0100111011             | ETB 1110100001                 |
| 11 | w 1110110101            | 1110100101             | w 1110111111             | 0011100101                     |
| 12 | s 1100110101            | 1100100101             | s 1100111111             | A 1000000101                   |
| 13 | x 0001110101            | 0001100101             | x 0001111111             | Q 1000100101                   |
| 14 | RS 0111100001           | RS 0111100001          | RS 0111100001            | FS 0011100001                  |
| 15 | % 1010011001            | % 1010011001           | % 1010011001             | % 1010011011                   |
| 16 | m 101010101             | 1011100101             | CR 1011000001            | CR 1011000001                  |
| 17 | SI 1111000001           | SI 1111000001          | SI 1111000001            | SI 1111000011                  |
| 18 | n 0111010101            | 0111100101             | SO 0111000001            | SO 0111000001                  |
| 19 | 0100111001              | 0100011001             | STX 0100000001           | STX 0100000001                 |
| 20 | 1100110001              | 1100011001             | NAK 1010100001           | NAK 1010100001                 |
| 21 | 1010010101              | 1010000101             | e 1010011111             | DC3 1100100001                 |
| 22 | d 0010010101            | 0010000101             | d 0010011111             | B 0100000101                   |
| 23 | c 1100010101            | 1100000101             | c 1100011111             | R 0100100101                   |
| 24 | 1111100100              | 1111100100             | 1111100100               | 0111100100                     |
| 25 | \$ 0010011001           | \$ 0010011001          | \$ 0010011001            | \$ 0010011011                  |
| 26 | L 0011000101            | L 0011000101           | L 0011000101             | L 0011000111                   |
| 27 | US 1111100001           | US 1111000001          | US 1111100001            | US 1111100011                  |
| 28 | 0110111001              | 0110011001             | ACK 0110000001           | ACK 0110000001                 |
| 29 | k 1101010101            | 1101100101             | DEL 1111111101           | DEL 1111111101                 |
| 30 | 4 0010111001            | 0010011001             | 4 0010111011             | DC4 0010100001                 |
| 31 | r 0100110101            | 0100100101             | r 0100111111             | ENQ 1010000001                 |
| 32 | f 0110010101            | 0110000101             | f 0110011111             | C 1100000101                   |
| 34 | SP 0000011000           | SP 0000011000          | SP 0000011000            | SP 0000011000                  |
| 35 | CAN 0001101000          | 0001011000             | CAN 0001100000           | BS 0001000000                  |
| 36 | CR 1011000001           | 1011000001             | CR 1011000001            | M 1011000101                   |
| 37 | 1101111101              | 1101111101             | 1101111101               | K 1010000101                   |
| 38 | VT 1101000000           | 1101000000             | VT 1101000000            | VT 1101000010                  |
| 39 | 7 1110111001            | 1110011001             | BEL 1110000001           | BEL 1110000001                 |
| 40 | 5 0100011001            | 0100011001             | 5 0100011001             | 5 0100011011                   |
| 41 | 1010111001              | 1010011001             | 5 1010111011             | STX 0100000001                 |
| 42 | g 1100010101            | 1100000101             | 1 0010111111             | EOT 0010000001                 |
| 43 | 0110110101              | 0110010101             | G 1100011111             | D 0010000101                   |
| 44 | ETX 1100000001          | ETX 1100000001         | ETX 1100000001           | S 1100100101                   |
| 45 | 1011111101              | 1011111101             | 1011111101               | ETX 1100000001                 |
| 46 | 1111111001              | 1111111001             | 1111111011               | N 0111000101                   |
| 47 | 1011011001              | 1011111001             | 1011011001               | [ 1101100101                   |
| 48 | 0001011001              | 1001011001             | 1001011001               | 1011011011                     |
| 49 | SP 0000011001           | SP 0000011001          | SP 0000011001            | SP 0000011011                  |
| 50 | 8 0110111001            | 0111111001             | 6 0110111011             | SOH 1000000001                 |
| 51 | 1001110101              | 1001111001             | y 1001111111             | DC1 1000100001                 |
| 52 | 0001010101              | H 0001000101           | h 0001011111             | E 0100000101                   |
| 53 | b 0100010101            | B 0100000101           | b 0100011111             | T 0010100101                   |
| 54 | 0101111001              | 0101011001             | 0101111011               | SYN 0110100001                 |
| 55 | 0111111001              | 0111111001             | > 0111111011             | Z 0101100101                   |
| 56 | 1101111001              | 1101011001             | > 1101111011             | Y 1001100101                   |
| 57 | NUL 0000000001          | NUL 0000000001         | NUL 0000000001           | NUL 0000000001                 |
| 58 | 0101011001              | 0101011001             | 0101011001               | 0101011011                     |
| 59 | 1000011001              | 1000011001             | 1000011001               | 1000011011                     |
| 60 | 7 1110111001            | & 0110011001           | 7 1110111011             | ETX 1100000001                 |
| 61 | u 1010110101            | U 1010100101           | u 1010111111             | BEL 1110000001                 |
| 62 | 0101010101              | J 0101000101           | j 0101011111             | F 0110000101                   |
| 63 | 0111010101              | N 0111000101           | n 0111011111             | U 1010100101                   |
| 64 | 1011111000              | = 1011111000           | = 1011111010             | = 0111111100                   |
| 65 | 0011111001              | < 0011111001           | < 0011111011             | W 1110100101                   |
| 66 | 0000110101              | P 0000100101           | p 0000111111             | J 0101000101                   |
| 67 | 0 0000111001            | 0 1001011001           | 0 0000111011             | DC2 0100100001                 |
| 68 | & 0110011001            | & 0110011001           | & 0110011001             | & 0110011011                   |
| 69 | # 1100011001            | # 1100011001           | # 1100011001             | # 1100011011                   |
| 70 | 8 0001111001            | * 0101011001           | 8 0001111011             | ESC 1101000001                 |
| 71 | 1001010101              | I 1001000101           | i 1001011111             | ACK 0110000001                 |
| 72 | k 1101010101            | K 1101000101           | k 1101011111             | G 1110000101                   |
| 73 | m 1011010101            | M 1011000101           | m 1011011111             | V 0110100101                   |
| 74 | 1111011001              | ? 1111111001           | / 1111011001             | 1111011001                     |
| 75 | 1100011001              | * 0100011001           | * 1110011001             | * 0100011001                   |
| 76 | LF 0101000000           | LF 0101000000          | LF 0101000000            | GS 1011100000                  |
| 77 | 1011111001              | 1101011001             | = 1011111001             | + 1101011001                   |
| 78 | FF 0011001001           | < 0011111001           | FF 0011000001            | FF 0011000011                  |
| 79 | 0001011001              | ( 0001011001           | ( 0001011001             | ( 0001011011                   |
| 80 | 9 1001111001            | 0001011001             | 9 1001111011             | EM 1001100001                  |
| 81 | 1111010101              | 0 1111000101           | o 1111011111             | 1011100101                     |
| 82 | 1 0011010101            | O 0011000101           | i 0011011111             | X 0001100101                   |
| 83 | 0011011001              | 0011011001             | 0011011001               | 0011011011                     |
| 84 | 0111011001              | 0111011001             | 0111011001               | 0111011011                     |
| 85 | 1101111001              | 0101111001             | 1101111001               | 0101111001                     |
| 86 | 1011100101              | 1101100101             | 1011100101               | 1101100101                     |
| 87 | 1011011001              | 1111100101             | 1011011001               | 1111100101                     |
| 88 | 0 0000111001            | 0 0000111001           | 0 0000111001             | 0 0000111001                   |
| 89 | 9 1001111001            | 1001011001             | HT 1001000001            | HT 1001000001                  |

## OPTIONS:

Internal Oscillator (Pins 1, 2, 3)  
Any Key Down (Pin 4) Positive Output  
N-Key Rollover only  
Pulse Data Ready signal

Internal Resistor to GND on Shift and Control Pins  
KR9600-STD outputs provides ASCII bits 1-6 on B1-B6, and bit 7 on B8

## CODING FOR KR9601 AND KR9602 STD

| XY | Normal<br>B-12345678 910 | Shift<br>B-12345678 910 | Control<br>B-12345678 910 | Shift/Control<br>B-12345678 910 |
|----|--------------------------|-------------------------|---------------------------|---------------------------------|
| 00 | 00000001 00              | 01010101 00             | 10101001 00               | 10101001 00                     |
| 01 | 00000010 01              | 01010101 01             | 10101010 01               | 10101010 01                     |
| 02 | 00000011 01              | 01010111 01             | 10101011 01               | 10101011 01                     |
| 03 | 00000100 01              | 01011000 01             | 10101100 01               | 10101100 01                     |
| 04 | 00000101 01              | 01011001 01             | 10101101 01               | 10101101 01                     |
| 05 | 00000110 01              | 01011010 01             | 10101110 01               | 10101110 01                     |
| 06 | 00000111 01              | 01011011 01             | 10101111 01               | 10101111 01                     |
| 07 | 00001000 01              | 01011100 01             | 10110000 01               | 10110000 01                     |
| 08 | 00001000 01              | 01011100 01             | 10110000 01               | 10110000 01                     |
| 09 | 00001001 01              | 01011101 01             | 10110001 01               | 10110001 01                     |
| 10 | 00001010 01              | 01011110 01             | 10110010 01               | 10110010 01                     |
| 11 | 00001011 01              | 01011111 01             | 10110011 01               | 10110011 01                     |
| 12 | 00001100 01              | 01100000 01             | 10110100 01               | 10110100 01                     |
| 13 | 00001100 01              | 01100000 01             | 10110100 01               | 10110100 01                     |
| 14 | 00001101 01              | 01100001 01             | 10110101 01               | 10110101 01                     |
| 15 | 00001110 01              | 01100010 01             | 10110110 01               | 10110110 01                     |
| 16 | 00001111 01              | 01100011 01             | 10110111 01               | 10110111 01                     |
| 17 | 00010000 01              | 01100100 01             | 10111000 01               | 10111000 01                     |
| 18 | 00010001 01              | 01100101 01             | 10111001 01               | 10111001 01                     |
| 19 | 00010010 01              | 01100110 01             | 10111010 01               | 10111010 01                     |
| 20 | 00010011 11              | 01100111 11             | 10111011 11               | 10111011 11                     |
| 21 | 00010100 11              | 01101000 11             | 10111100 11               | 10111100 11                     |
| 22 | 00010101 11              | 01101001 11             | 10111101 11               | 10111101 11                     |
| 23 | 00010110 11              | 01101010 11             | 10111110 11               | 10111110 11                     |
| 24 | 00010111 11              | 01101011 11             | 10111111 11               | 10111111 11                     |
| 25 | 00011000 11              | 01101100 11             | 11000000 11               | 11000000 11                     |
| 26 | 00011001 11              | 01101101 11             | 11000001 11               | 11000001 11                     |
| 27 | 00011010 11              | 01101110 11             | 11000010 11               | 11000010 11                     |
| 28 | 00011011 11              | 01101111 11             | 11000011 11               | 11000011 11                     |
| 29 | 00011100 11              | 01110000 11             | 11000100 11               | 11000100 11                     |
| 30 | 00011101 01              | 01110001 01             | 11000101 01               | 11000101 01                     |
| 31 | 00011110 01              | 01110010 01             | 11000110 01               | 11000110 01                     |
| 32 | 00011111 01              | 01110011 01             | 11000111 01               | 11000111 01                     |
| 33 | 00011111 01              | 01110011 01             | 11000111 01               | 11000111 01                     |
| 34 | 00100000 01              | 01110100 01             | 11001000 01               | 11001000 01                     |
| 35 | 00100001 01              | 01110101 01             | 11001001 01               | 11001001 01                     |
| 36 | 00100010 01              | 01110110 01             | 11001010 01               | 11001010 01                     |
| 37 | 00100011 01              | 01110111 01             | 11001011 01               | 11001011 01                     |
| 38 | 00100100 01              | 01111000 01             | 11001100 01               | 11001100 01                     |
| 39 | 00100101 01              | 01111001 01             | 11001101 01               | 11001101 01                     |
| 40 | 00100110 11              | 01111010 11             | 11001110 11               | 11001110 11                     |
| 41 | 00100111 11              | 01111011 11             | 11001111 11               | 11001111 11                     |
| 42 | 00101000 11              | 01111100 11             | 11010000 11               | 11010000 11                     |
| 43 | 00101001 11              | 01111101 11             | 11010001 11               | 11010001 11                     |
| 44 | 00101010 11              | 01111110 11             | 11010010 11               | 11010010 11                     |
| 45 | 00101011 11              | 01111111 11             | 11010011 11               | 11010011 11                     |
| 46 | 00101100 11              | 10000000 11             | 11010100 11               | 11010100 11                     |
| 47 | 00101101 11              | 10000001 11             | 11010101 11               | 11010101 11                     |
| 48 | 00101110 11              | 10000010 11             | 11010110 11               | 11010110 11                     |
| 49 | 00101111 01              | 10000011 01             | 11010111 01               | 11010111 01                     |
| 50 | 00110000 01              | 10000100 01             | 11011000 01               | 11011000 01                     |
| 51 | 00110001 01              | 10000101 01             | 11011001 01               | 11011001 01                     |
| 52 | 00110010 01              | 10000110 01             | 11011010 01               | 11011010 01                     |
| 53 | 00110011 01              | 10000111 01             | 11011011 01               | 11011011 01                     |
| 54 | 00110010 01              | 10000110 01             | 11011010 01               | 11011010 01                     |
| 55 | 00110011 01              | 10000111 01             | 11011011 01               | 11011011 01                     |
| 56 | 00110100 01              | 10001000 01             | 11011100 01               | 11011100 01                     |
| 57 | 00110101 00              | 10001001 00             | 11011101 00               | 11011101 00                     |
| 58 | 00110110 01              | 10001010 01             | 11011110 01               | 11011110 01                     |
| 59 | 00110111 01              | 10001011 01             | 11011111 01               | 11011111 01                     |
| 60 | 00111000 11              | 10001100 11             | 11100000 11               | 11100000 11                     |
| 61 | 00111001 11              | 10001101 11             | 11100001 11               | 11100001 11                     |
| 62 | 00111010 11              | 10001110 11             | 11100010 11               | 11100010 11                     |
| 63 | 00111011 11              | 10001111 11             | 11100011 11               | 11100011 11                     |
| 64 | 00111100 11              | 10001000 11             | 11100100 11               | 11100100 11                     |
| 65 | 00111101 11              | 10001001 11             | 11100101 11               | 11100101 11                     |
| 66 | 00111110 11              | 10001010 11             | 11100110 11               | 11100110 11                     |
| 67 | 00111111 11              | 10001011 11             | 11100111 11               | 11100111 11                     |
| 68 | 00111111 11              | 10001011 11             | 11100111 11               | 11100111 11                     |
| 69 | 00111111 11              | 10001011 11             | 11100111 11               | 11100111 11                     |
| 70 | 01000000 01              | 10010100 01             | 11101000 01               | 11101000 01                     |
| 71 | 01000001 01              | 10010101 01             | 11101001 01               | 11101001 01                     |
| 72 | 01000010 01              | 10010110 01             | 11101010 01               | 11101010 01                     |
| 73 | 01000011 01              | 10010111 01             | 11101011 01               | 11101011 01                     |
| 74 | 01000100 01              | 10011000 01             | 11101100 01               | 11101100 01                     |
| 75 | 01000101 01              | 10011001 01             | 11101101 01               | 11101101 01                     |
| 76 | 01000110 01              | 10011010 01             | 11101110 01               | 11101110 01                     |
| 77 | 01000111 01              | 10011011 01             | 11101111 01               | 11101111 01                     |
| 78 | 01001000 01              | 10011100 01             | 11110000 01               | 11110000 01                     |
| 79 | 01001001 01              | 10011101 01             | 11110001 01               | 11110001 01                     |
| 80 | 01001010 01              | 10011110 01             | 11110010 01               | 11110010 01                     |
| 81 | 01001011 01              | 10011111 01             | 11110011 01               | 11110011 01                     |
| 82 | 01001100 01              | 10100000 01             | 11110100 01               | 11110100 01                     |
| 83 | 01001101 01              | 10100001 01             | 11110101 01               | 11110101 01                     |
| 84 | 01001110 01              | 10100010 01             | 11110110 01               | 11110110 01                     |
| 85 | 01001111 01              | 10100011 01             | 11110111 01               | 11110111 01                     |
| 86 | 01010000 01              | 10100100 01             | 11110000 01               | 11110000 01                     |
| 87 | 01010001 01              | 10100101 01             | 11110001 01               | 11110001 01                     |
| 88 | 01010010 01              | 10100110 01             | 11110010 01               | 11110010 01                     |
| 89 | 01010011 01              | 10100111 01             | 11110011 01               | 11110011 01                     |

### OPTIONS FOR THE KR9601-STD:

PINS 1, 2, 3 INTERNAL OSCILLATOR [input clock divisor = 1]  
 PIN 4 CE [Active Low]  
 PIN 5 AR1 [AR0 fixed at Lo = 0]  
 [FIXED LONG DELAY OF 40000 CLOCK TIMES]  
 [FIXED SHORT DELAY OF 6250 CLOCK TIMES]

PIN 6 AKO [positive true]

Pulsed DATA READY signal

N-KEY ROLLOVER

Pull-down resistor to ground at the following pins:

- SHIFT
- CONTROL
- CAPS-LOCK
- ARO

### OPTIONS FOR THE KR9602-STD:

N-KEY ROLLOVER

AUTO-REPEAT

(FIXED LONG DELAY OF 40000 CLOCK TIMES)  
 (FIXED SHORT DELAY OF 6250 CLOCK TIMES)

1 STOP bit.

No PARITY bit.

Input clock divisor of 63

Pull-down resistor to ground at the following pins:

- SHIFT
- CONTROL
- CAPS-LOCK

## CODING FOR KR9602-012 (ASCII)

| XY | Normal<br>B-12345678910 | Shift<br>B-12345678910 | Control<br>B-12345678910 | Shift Control<br>B-12345678910 |
|----|-------------------------|------------------------|--------------------------|--------------------------------|
| 00 | 0000110001              | 1001010001             | 0000110001               | 1001010001                     |
| 01 | 1001110001              | 0001010001             | 1001110001               | 0001010001                     |
| 02 | 0001110001              | 0101010001             | 0001110001               | 0101010001                     |
| 03 | 1101110001              | 0110010001             | 1101110001               | 0110010001                     |
| 04 | 0101110001              | 0111101001             | 0101110001               | 0111101001                     |
| 05 | 1010110001              | 1010010001             | 1010110001               | 1010010001                     |
| 06 | 0010110001              | 0010010001             | 0010110001               | 0010010001                     |
| 07 | 1100110001              | 1100010001             | 1100110001               | 1100010001                     |
| 08 | 0100110001              | 0000010001             | 0100110001               | 0000010001                     |
| 09 | 1000110001              | 1000100001             | 1000110001               | 1000100001                     |
| 10 | 0001000001              | 0001000001             | 0001000001               | 0001000001                     |
| 11 | 1010110001              | 1101010001             | 1011110001               | 1101010001                     |
| 12 | 1011010001              | 1111101001             | 1111100001               | 1111100101                     |
| 13 | 1010101001              | 1010111001             | 1011100001               | 1010100101                     |
| 14 | 1101101001              | 1101111001             | 1101100000               | 1101100100                     |
| 15 | 1111011011              | 0000101011             | 0000100011               | 0000100111                     |
| 16 | 1111011011              | 1111001011             | 1111100011               | 1111000111                     |
| 17 | 1001011011              | 0010010111             | 1001000011               | 1001000111                     |
| 18 | 1010111011              | 1010101011             | 1010100011               | 1010100111                     |
| 19 | 1001111011              | 1001101011             | 1001100011               | 1001100111                     |
| 20 | 0010111011              | 0010101011             | 0010100011               | 0010100111                     |
| 21 | 0100111011              | 0100101011             | 0100100011               | 0100100111                     |
| 22 | 1010011011              | 1010001011             | 1010000011               | 1010000111                     |
| 23 | 1110111011              | 0101001011             | 1110100011               | 1110100111                     |
| 24 | 1000111011              | 1000101011             | 1000100011               | 1000100111                     |
| 25 | 1101100000              | 1011000000             | 1101100000               | 1011000000                     |
| 26 | 1001000001              | 1001000101             | 1001000001               | 1001000101                     |
| 27 | 1011000001              | 1011000001             | 1011000001               | 1011000001                     |
| 28 | 0000011001              | 0111111001             | 0000011001               | 0111111001                     |
| 29 | 1110010001              | 0100010001             | 1110010001               | 0100010001                     |
| 30 | 1101110001              | 0101110001             | 1101110001               | 0101110001                     |
| 31 | 0011011011              | 0011001011             | 0011000011               | 0011000111                     |
| 32 | 1101011011              | 1010010111             | 1101000011               | 1010000111                     |
| 33 | 0101011011              | 0101001011             | 0101000011               | 0101000111                     |
| 34 | 0001011011              | 0001001011             | 0001000011               | 0001000111                     |
| 35 | 1110011011              | 1110001011             | 1110000011               | 1110000111                     |
| 36 | 0110011011              | 0110001011             | 0110000011               | 0110000111                     |
| 37 | 0010011011              | 0010001011             | 0010000011               | 0010000111                     |
| 38 | 1100111011              | 1100101011             | 1100100011               | 1100100111                     |
| 39 | 1000111011              | 1000010111             | 1000000011               | 1000000111                     |
| 40 | 1111010001              | 1111100001             | 1111010001               | 1111100001                     |
| 41 | 0111010001              | 0111110001             | 0111010001               | 0111110001                     |
| 42 | 0011010001              | 0011110001             | 0011010001               | 0011110001                     |
| 43 | 1011011011              | 1011001011             | 1011000011               | 1011000111                     |
| 44 | 0111011011              | 0111001011             | 0111000011               | 0111000111                     |
| 45 | 0100011011              | 0100001011             | 0100000011               | 0100000111                     |
| 46 | 0110111011              | 0110101011             | 0110100101               | 0110100111                     |
| 47 | 1100011011              | 1100001011             | 1101001011               | 1100000111                     |
| 48 | 0001100011              | 0001100011             | 0001100101               | 0001100111                     |
| 49 | 0101111011              | 0101101011             | 0101100011               | 0101100111                     |
| 50 | 0011110101              | 0011111001             | 0011100001               | 0011100101                     |
| 51 | 0000010001              | 0000010001             | 0000010001               | 0000010001                     |
| 52 | 1010000001              | 1010000001             | 1010000101               | 1010000101                     |
| 53 | 0110000001              | 0110000001             | 0110000101               | 0110000101                     |
| 54 | 1110000001              | 1110000001             | 1110000101               | 1110000101                     |
| 55 | 1001000001              | 1001000001             | 1001000101               | 1001000101                     |
| 56 | 0101000001              | 0101000001             | 0101000101               | 0101000101                     |
| 57 | 1101000001              | 1101000001             | 1101000101               | 1101000101                     |
| 58 | 0111000001              | 0111000001             | 0111000101               | 0111000101                     |
| 59 | 1111000001              | 1111000001             | 1111000101               | 1111000101                     |
| 60 | 0000100001              | 0000100001             | 0000100101               | 0000100101                     |
| 61 | 1000100001              | 1000100001             | 1000100101               | 1000100101                     |
| 62 | 0100100001              | 0100100001             | 0100100101               | 0100100101                     |
| 63 | 1100100001              | 1100100001             | 1100100101               | 1100100101                     |
| 64 | 0010000001              | 0010000001             | 0010000101               | 0010000101                     |
| 65 | 1010100001              | 1010100001             | 1010100101               | 1010100101                     |
| 66 | 0110100001              | 0110100001             | 0110100101               | 0110100101                     |
| 67 | 1110100001              | 1110100001             | 1110100101               | 1110100101                     |
| 68 | 0001100001              | 0001100001             | 0001100101               | 0001100101                     |
| 69 | 1001100001              | 1001100001             | 1001100101               | 1001100101                     |
| 70 | 0101100001              | 0101100001             | 0101100101               | 0101100101                     |
| 71 | 0011100001              | 0011100001             | 0011100101               | 0011100101                     |
| 72 | 1011100001              | 1011100001             | 1011100101               | 1011100101                     |
| 73 | 0111100001              | 0111100001             | 0111100101               | 0111100101                     |
| 74 | 1111100001              | 1111100001             | 1111100101               | 1111100101                     |
| 75 | 0000000001              | 0000000001             | 0000000101               | 0000000101                     |
| 76 | 1000000001              | 1000000001             | 1000000101               | 1000000101                     |
| 77 | 0100000001              | 0100000001             | 0100000101               | 0100000101                     |
| 78 | 1100000001              | 1100000001             | 1100000101               | 1100000101                     |
| 79 | 0010000001              | 0010000001             | 0010000101               | 0010000101                     |
| 80 | 0000110111              | 0000110011             | 0000110111               | 0000110011                     |
| 81 | 1001110111              | 1001110011             | 1001110111               | 1001110011                     |
| 82 | 1000100011              | 0001110011             | 1000100011               | 0001110011                     |
| 83 | 1110110111              | 1110110011             | 1110110111               | 1110110011                     |
| 84 | 1100100011              | 0110110011             | 1100100011               | 0110110011                     |
| 85 | 1010110111              | 1010110011             | 1010110111               | 1010110011                     |
| 86 | 0100100011              | 0010110011             | 0100100011               | 0010110011                     |
| 87 | 1100110111              | 1100110011             | 1100110111               | 1100110011                     |
| 88 | 0010100011              | 0100110011             | 0010100011               | 0100110011                     |
| 89 | 1000110011              | 1000110011             | 1000110111               | 1000110011                     |

### OPTIONS FOR THE KR9602-012 ASCII:

Lockout

Auto Repeat

(Fixed Long Delay of 60,000 Clock Times)

(Fixed Short Delay of 2000 Clock Times)

One Stop Bit

Input Clock Divisor of 32

No Parity

Eight Data Bits

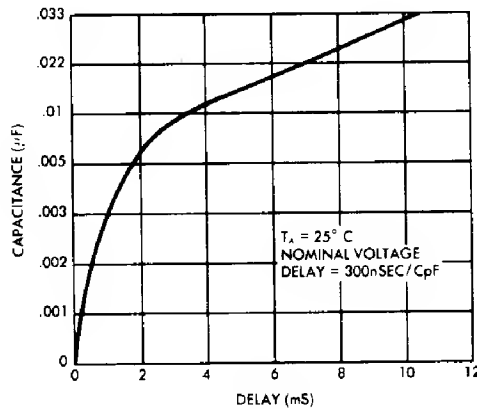
Pull down Resistor to Ground is at the following pins:

— SHIFT

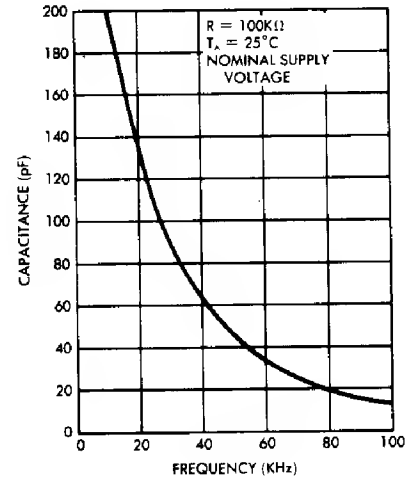
— CONTROL

— CAPS LOCK

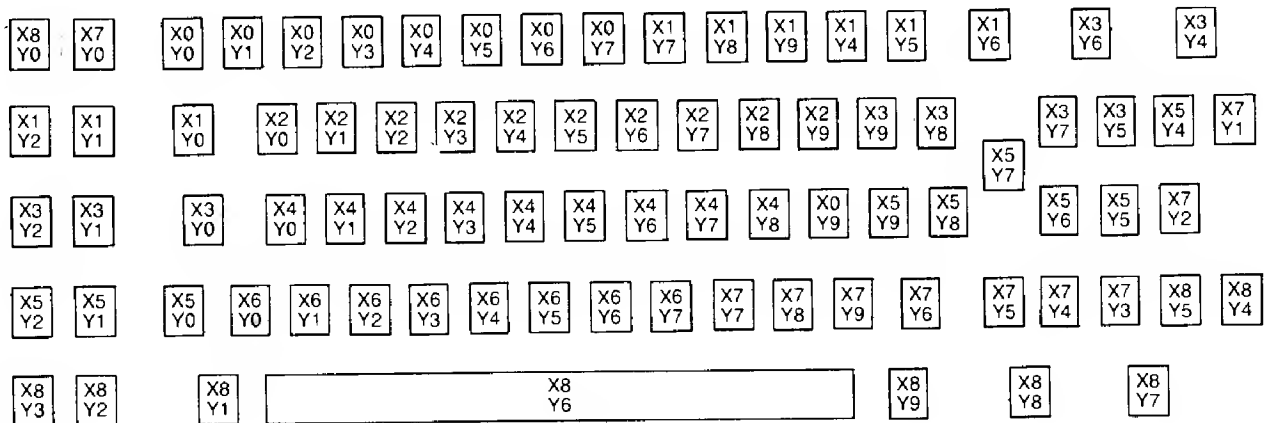
### STROBE DELAY vs C2 FOR KR9600/1/2



### OSCILLATOR FREQUENCY vs C1 FOR KR9600/KR9601



### KEYBOARD LAYOUT FOR KR9601/9602-STD



**STANDARD MICROSYSTEMS CORPORATION**

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(516) 273-3100 TWX 510-227-8896

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